

**REMARKS**

This Application has been carefully reviewed in light of the Office Action mailed October 20, 2004. Claims 1-26 are currently pending.

**Antecedent Basis Note**

The Examiner “noted” that Claim 12 lacked antecedent basis. Appropriate amendments have been made.

**Section 102 Rejections**

Claims 1, 2, 11, 16 and 26 were rejected under 35 U.S.C. §102(e) as being anticipated by PCT Publication No. WO 03/070414 A1, listing Fehrmann et al. as inventors (“*Fehrmann*”), filed February 10, 2003. Additionally, Claims 1, 6, 8, 9, 10, 11, 14-16, 24, 25 and 26 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,122,564 issued to Koch et al. (“*Koch*”). While Applicants disagree with these rejections, Applicants have nonetheless amended independent Claims 1, 11, and 26. Applicants submit that *Fehrman* does not disclose at the least the following limitation of amended Claim 1:

“adjusting, in substantially real-time, a laser power of the laser based on the comparison in order to correlate the characteristic of the molten pool with the respective characteristic of the target molten pool and thereby control the *size of the molten pool*” (emphasis added)

*Fehrman* has no concern as to the “size of the molten pool”. Rather, *Fehrman* is concerned with the *temperature* of a melt pool described in the specification as follows:

- “From the melt pool 7 an optical signal 13 is continuously captured and used for the determination of the temperature . . .” (Page 8, lines 19-20);
- “The optical signal 13 from the melt pool 7 is coupled to a pyrometer 15 or another fiber-coupled detector which allows the online determination of the melt pool temperature. For this purpose the optical properties of the monitoring system are chosen such that the measurement spot is *smaller* than the melt pool and located at the center of the melt pool 7.” (Page 9, lines 19-23) (emphasis added); and

- “The temperature information is used for the adjustment of process parameters such as the laser power, the relative speed between the laser beam 6 and the article 1, the feed rate of the injected powder 8 with the carrier gas 9 or an injected wire. For the method of remelting of the surface 5 of the article only one or a combination of the process parameters laser power and/or the relative speed between the laser beam 6 and the article 1 is used.” (Page 10, lines 7-10).

A disclosure of gathering *portions* of a molten pool for temperature information certainly does not disclose *a size of the molten pool* being controlled. Accordingly, for at least this reason, Claim 1 as amended is allowable over *Fehrman*.

Applicants additionally submit that *Koch* does not disclose at the least the following limitation of Claim 1:

“imaging, with an imaging device *coaxially aligned* with a laser nozzle, a molten pool on a substrate, the molten pool created by a laser” (emphasis added)

In Figure 3 of *Koch*, a feedback unit 302 is shown “adjacent to the point where the laser and powder are incident on the surface of the work piece.” (*Koch*, Column 5, lines 51-52). Clearly this does not disclose an “imaging device coaxially aligned with a laser nozzle.” This feedback aspect is disclosed in *Koch* as follows:

“In the feedback aspect of the invention, the phototransistor sends a signal to the numerical controller of FIG. 1, which then adjusts voltage supply to the laser, controlling laser power, and finally adjusting laser duration incident on the workpiece substrate. The voltage of the analog signal corresponds to laser power. This enables direct metal deposition and control of the *height* of each pass, as layer upon layer of cladding is built up.” (Column 7, lines 54-6) (emphasis added).

Coaxial alignment of *Koch*’s feedback aspect/unit with the laser shown in Figure 3 of *Koch* would disable measurement of height. Accordingly, for at least this reason, Claim 1 as amended is allowable over *Koch*.

Independent Claims 11, 16, and 26 recite limitations that are similar, although not identical, to the limitations of Claim 1. Therefore, Claims 11, 16, and 26 are allowable for analogous reasons. Applicants’ dependent Claims 2-10, 12-15, and 17-25 are allowable based on their dependence on the independent Claim 1, 11, and 16 and further because they recite numerous additional patentable distinctions over the cited reference of the rejection.

Because Applicants believe they have amply demonstrated the allowability of independent Claims 1, 11, 16 over the cited reference of the rejection, and to avoid burdening the record, Applicants have not provided additional detailed remarks concerning these dependent claims. Applicants, however, remain ready to provide such remarks if it becomes appropriate to do so.

**Section 103 Rejections**

Claims 2, 7, 17 and 22 were rejected under 35 U.S.C. §103(a) as being obvious over *Koch* in view of U.S. Patent No. 6,311,099 issued to Jasper et al. ("*Jasper*"); Claims 3, 4, 18 and 19 were rejected under 35 U.S.C. §103(a) as being obvious over *Koch* in view of *Jasper*, as applied to Claims 2 and 17 above, and further in view of the article written by Hu et al. entitled "Improving Solid Freeform Fabrication by Laser-Based Additive Manufacturing" ("*Hu*"); and Claims 5, 6, 8, 12, 13, 17, 20, 21, and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Koch* in view of *Hu*. These rejections are moot because the independent Claims 1, 11, 16, are allowable, as described above.

**CONCLUSIONS**

Applicants have made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, and for other reasons clearly apparent, Applicants respectfully request full allowance of all pending Claims. If the Examiner feels that a telephone conference or an interview would advance prosecution of this Application in any manner, the undersigned attorney for Applicants stands ready to conduct such a conference at the convenience of the Examiner.

Applicants believe no fee is due. However, should there be a fee discrepancy, the Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. **02-0384 of Baker Botts L.L.P.**

Respectfully submitted,

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